Precalc Warm Up # 1-3

Warm up sheets by the door.
Sit anywhere.

1. Fill in your name and Week 1 at the top of the page, then flip it over to the Wednesday space.

2. Take a minute to tell me if you have any concerns about this class or have a particular seating request. Table groups will be assigned for next Monday. I will generally try to assign new groups each chapter so you have a chance to work with a variety of people.

Welcome to Precalculus!

Your course syllabus can be found online at:

nicholsonsehs.wikispaces.com

Notation Activity:

Using the notation summary guide, work in pairs at your table group on the notation worksheet.

After a while I will ask you to check in with the other pair at your table group to carefully compare the details of your answers and finish as a group.

All 4 group member names go on your worksheet, with your name at the top.

I will briefly put up the answers for one last chance to fix up any details.

As a group, decide which worksheet will be easiest for me to read and staple that one at the top of the other three and turn them in.

I grade the top paper and that score goes to everyone in the group.

Check the details of your answers:

How would you write the following in set notation?

1. 

$\{x: -2 \leq x < 10\}$

2. 

$\{x: x \leq 5\}$

3. $[6, 14)$
$\{x: 6 \leq x < 14\}$

4. $(-3, \infty)$
$\{x: x > -3\}$

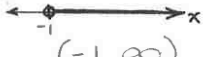
5. $(-\infty, 2]$
$\{x: x \leq 2\}$

6. $[4, 10[$
$\{x: 4 \leq x < 10\}$

How would you write the following in interval notation?

7. 

$[-1, 5]$

8. 

$(-1, \infty)$

9. $0 \leq x < 10$
$[0, 10)$

10. $x \geq 7$
$[7, \infty)$

11. $\{x \mid x < 9\}$
$(-\infty, 9)$

12. $\{x: 1 < x \leq 4\}$
$(1, 4]$

Graph the following on a number line:

13. $(2, 10]$

14. $\{x: -1 < x \leq 2\}$

15. $[1, \infty)$

Predict what these graphs would look like:
(U = Union ∩ = Intersection)

16. $(-\infty, 2] \cap [-5, \infty)$

17. $\{x \mid x < -3\} \cup \{x \mid x > 4\}$

18. $\{x: -5 \leq x < 2\} \setminus \{-3\}$

As a group, decide which worksheet will be easiest for me to read and staple that one at the top of the other three and turn them in.

I will grade the top paper and that score goes to everyone in the group.

What's next:

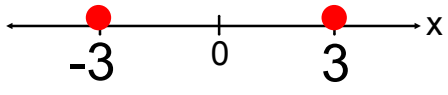
1) Some notes you will need for tonight's assignment
2) At 1:50, go down to the AV room and get your books.

(You will need student body card)

Review Absolute Value:

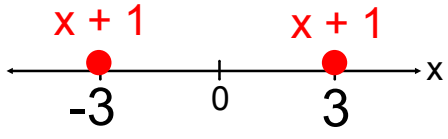
Using the definition of absolute value as the distance from zero on the real number line:

$|x| = 3$ means that the value of x is 3 units from zero on the number line



$x = -3$ or $x = 3$

$|x + 1| = 3$ means that the value of $x + 1$ is 3 units from zero on the number line

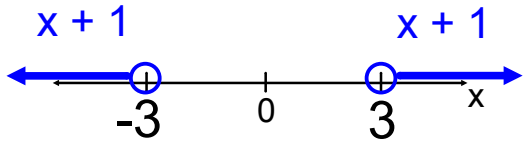


$x + 1 = -3$ or $x + 1 = 3$

$-1 \quad -1 \qquad -1 \quad -1$

$x = -4$ or $x = 2$

$|x + 1| > 3$ means that the value of $x + 1$ is more than 3 units from zero on the number line

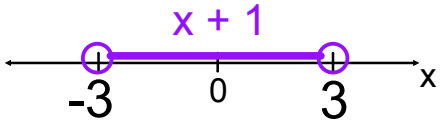


$x + 1 < -3$ or $x + 1 > 3$

$-1 \quad -1 \qquad -1 \quad -1$

$x < -4$ or $x > 2$

$|x + 1| < 3$ means that the value of $x + 1$ is less than 3 units from zero on the number line



$-3 < x + 1 < 3$

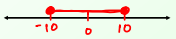
$-1 \quad -1 \quad -1$

$-4 < x < 2$

You try. Answer in both interval and set notation.
Graph on a number line.

1. $\{x : |x| \le 10\}$

x is 10 or less units from zero:

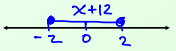


$\{x : -10 \le x \le 10\}$

$[-10, 10]$

2. $|x+12| \le 2$

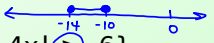
$(x+12)$ is 12 or less away from zero



$-2 \le x+12 \le 2$

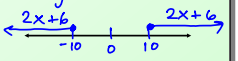
$\{x : -14 \le x \le -10\}$

$[-14, -10]$



3. $|2x + 6| \ge 10$

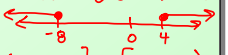
$2x+6$ is 10 or MORE away from zero



$2x+6 \le -10$ or $2x+6 \ge 10$

$2x \le -16$ $\quad 2x \ge 4$

$x \le -8$ or $x \ge 4$



$(-\infty, -8] \cup [4, \infty)$

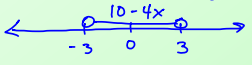
$\{x : x \le -8\} \cup \{x : x \ge 4\}$

4. $\{x: \cancel{2}\ |10 - 4x| \ge -6\}$

$\cancel{-2}$ $\quad -2$

$|10 - 4x| < 3$

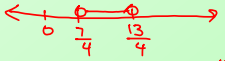
$(10 - 4x)$ is less than 3 away from zero:



$-3 < 10 - 4x < 3$

$\frac{-13}{-4} \ge \frac{-4x}{-4} \ge \frac{-7}{-4}$

$\frac{13}{4} > x > \frac{7}{4}$ → Now rewrite in number line order!



$\{x: \frac{7}{4} < x < \frac{13}{4}\}$ $\quad \left(\frac{7}{4}, \frac{13}{4}\right)$

SL Ch. 2 What type of number is $\sqrt{20}$? Irrational

$\sqrt{20} \cdot \sqrt{5} = \sqrt{100}$

$= 10$

$\sqrt{20} \cdot \sqrt{6} = \sqrt{120}$

$= \sqrt{4}\sqrt{30}$

$= 2\sqrt{30}$

$$\sqrt{a} \cdot \sqrt{b} = \sqrt{ab}$$

$\frac{\sqrt{20}}{\sqrt{5}} = \sqrt{\frac{20}{5}}$

$= \sqrt{4}$

$= 2$

$\frac{\sqrt{20}}{\sqrt{6}} = \sqrt{\frac{20}{6}}$

$= \sqrt{\frac{10}{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}}$

$= \frac{\sqrt{30}}{3}$

$$\frac{\sqrt{a}}{\sqrt{b}} = \sqrt{\frac{a}{b}}$$

$$\sqrt{20}+\sqrt{5} \stackrel{?}{=} \sqrt{25}$$

$\approx 4.5 + 2.2 \neq 5$

You need like radicals to combine:

$\sqrt{20} + \sqrt{5}$

$\sqrt{4}\sqrt{5} + \sqrt{5}$

$2\sqrt{5} + \sqrt{5}$

$\boxed{3\sqrt{5}}$

Combining radicals:

$$\sqrt{200}-\sqrt{18} =$$

$\sqrt{100}\sqrt{2} - \sqrt{9}\sqrt{2}$

$10\sqrt{2} - 3\sqrt{2}$

$\boxed{7\sqrt{2}}$

Multiplying expressions with radicals: distribute

$$\left(\sqrt{2}+\sqrt{3}\right)\left(\sqrt{6}-\sqrt{3}\right) = \sqrt{12} - \sqrt{6} + \sqrt{18} - \sqrt{9}$$

$\sqrt{4}\sqrt{3} - \sqrt{6} + \sqrt{9}\sqrt{2} - 3$

$\boxed{2\sqrt{3} - \sqrt{6} + 3\sqrt{2} - 3}$

$$\left(\sqrt{5}+\sqrt{2}\right)^2 \neq (\sqrt{5})^2 + (\sqrt{2})^2$$

squaring a binomial means:

$(\sqrt{5}+\sqrt{2})(\sqrt{5}+\sqrt{2})$

recall that $(a+b)^2 = a^2 + 2ab + b^2$

for $(\sqrt{5}+\sqrt{2})^2$, $a = \sqrt{5}$ $b = \sqrt{2}$, apply the pattern!

$(\sqrt{5})^2 + 2(\sqrt{5})(\sqrt{2}) + (\sqrt{2})^2$

$5 + 2\sqrt{10} + 2$

$\boxed{7 + 2\sqrt{10}}$

$(\sqrt{5}+\sqrt{2})(\sqrt{5}-\sqrt{2}) = 5 + \sqrt{10} - \sqrt{10} - 2$

$= \boxed{3}$

These are called **CONJUGATES**

Can be used to change an irrational expression into a rational expression

$$(a+b)(a-b) = a^2 - b^2$$

A sum & difference pattern multiplies to be the difference of squares

Dividing expressions: make sure to rationalize the denominator. Use conjugates!

$$\frac{1}{2+\sqrt{3}} \cdot \frac{2-\sqrt{3}}{2-\sqrt{3}} = \frac{2-\sqrt{3}}{(2)^2-(\sqrt{3})^2} = \frac{2-\sqrt{3}}{4-3}$$

$$= \boxed{2-\sqrt{3}}$$

$$\frac{1+\sqrt{2}}{2\sqrt{3}-1} \cdot \frac{2\sqrt{3}-1}{2\sqrt{3}-1} \Rightarrow$$ distribute carefully!

HW 1-3: (Week 1, Wednesday)

SL Book p. 20

#1-4, 5ce, 6b, 7bce, 8, 9

Go get 2 PreCalc books.
Bring only the SL book tomorrow.

EXERCISES 2.1

1. Show the following sets on the real number line.

(a) $\{x|2 \le x \le 8\}$ (b) $\{x|x > 7\}$ (c) $\{x|-2 < x \le 6\} \setminus \{4\}$

(d) $]2, 7] \cap]4, 8[$ (e) $(-\infty, 4) \cap [-2, 5)$ (f) $\{x : x < -6\}$

2. Write the following using interval notation.

(a) $\{x|-2 \le x \le 7\}$ (b) $\{x|x > 9\}$

(c) $\{x|0 < x \le 5\}$ (d) $\{x : x \le 0\}$

(e) $\{x : x < 8\} \cap \{x : x > -4\}$ (f) $\{x : x < -1\} \cup \{x : x > 2\}$

3. Simplify the following.

(a) $3\sqrt{5}+\sqrt{20}$ (b) $2\sqrt{3}-\sqrt{27}$ (c) $\sqrt{2}+\sqrt{3}+\sqrt{8}-\sqrt{18}$

4. Simplify the following.

(a) $(\sqrt{5}+1)(\sqrt{5}-1)$ (b) $(2\sqrt{3}-\sqrt{2})(\sqrt{2}+\sqrt{3})$

(c) $(3\sqrt{2}-\sqrt{6})(\sqrt{3}+3)$ (d) $(2+3\sqrt{3})^2$

5. Rationalise the denominator in each of the following.

(a) $\dfrac{1}{2+\sqrt{3}}$ (b) $\dfrac{3}{\sqrt{7}-2}$ (c) $\dfrac{\sqrt{3}}{\sqrt{5}-2}$

(d) $\dfrac{2\sqrt{5}+1}{\sqrt{3}-2}$ (e) $\dfrac{\sqrt{2}+\sqrt{3}}{\sqrt{3}-\sqrt{5}}$ (f) $\dfrac{2\sqrt{3}}{2\sqrt{5}-3\sqrt{2}}$

6. (a) If $x=\sqrt{5}+\sqrt{3}$, find the value of i. $x+\dfrac{1}{x}$ ii. $x^2+\dfrac{1}{x^2}$

(b) If $x=4+\sqrt{3}$, find the value of i. $x-\dfrac{1}{x}$ ii. $x^2+\dfrac{1}{x^2}$

7. Find the value of x if

(a) $\{x||x|=3\}$ (b) $\{x||x|=10\}$ (c) $\{x||x|=-2\}$

(d) $\{x||x+1|=3\}$ (e) $\{x||x+2|=10\}$ (f) $\{x||x-2|=2\}$

8. Represent each of the following on the real number line.

(a) $\{x:|x|\le 5\}$ (b) $\{x||x|>2\}$

(c) $\{x:2\le|x|<5\}$ (d) $\{x:2|x|\ge 8\}$

9. Write the following using interval notation.

(a) $\{x|x-1>0\}$ (b) $\left\{x|\frac{1}{2}x>2\right\}$ (c) $\{x:x>4\}\cap\{x:2x<12\}$